the invaluable deposits that have of late years been opened up in North America, where not only the successive periods of the tertiary epoch form extensive deposits, but where they moreover contain perfectly preserved animal specimens which have lived in these successive periods, and which indeed show in the most irrefutable way that a direct connection accompanied by an increase of differentiation undeniably exists. We here find a very remarkable page of the book thrown open upon which nature has written down for us the history of the development of the horse, and whoever has learnt to read this handwriting is brought to the inevitable conclusion: this development has started from an older form of a less specialised organisation, and has proceeded along successive steps which are entirely in accordance with the theory of evolution.

Similarly the numerous remains of the fossil group of the Ornithoscelidæ are only known since a recent date, and a gradually increasing knowledge is thus attained of those interesting animals which link together reptiles and birds, two classes of animals which were formerly looked upon as amongst the most thoroughly separated.

Together with these irrefutable proofs that evolution has indeed taken place, starting from the simpler, more generalised types, and tending towards the more complicated and more specialised forms, palæontology acquaints us with certain other facts. I allude to the persistence of the same form, of the same genus, sometimes even of the same species in all successive strata and periods. Thus, for example, among Mollusks, Chiton and Pleurotomaria have persisted from the Silurian down to the present period; Dentalium from the Devonian; Pinna and Cyprina from the Carboniferous period. Amongst the Foraminifera certain genera occur in the Carboniferous epoch, which at the same time are members of the living fauna. Amongst Brachiopods our living Lingulas, Rhynchonellas, and Terebratulas are very ancient types; representatives of the osseous fishes lived in the Cretaceous period, which cannot be generically distinguished from their living relatives, whilst certain genera of cartilaginous fishes reach even into a much farther distant past.

(*To be continued.*)

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

OXFORD.—Owing to the early occurrence of Easter, the term has begun a week earlier than usual this year. The first University business of importance will be the constitution of the New Boards of Faculties. These will consist of the professors as *ex-officio* members, and of members elected by the College lecturers in the various faculties, the number to be so elected being first decided by vote. The first step towards the new state of things has been the appointment of Mr. Lockhart, of Hertford College, as General Secretary to the Board of Faculties.

In the department of Physics at the University Museum, Prof. Clifton continues his course on the Electricity Developed by the Contact of different Substances; Mr. Stocker lectures on Mechanics, and Mr. Heaton on Problems on Mechanics and Physics. Prof. Price continues his course on Optics, and also gives a course on Hydro-mechanics.

Prof. Pritchard is absent in Egypt completing his measurements of the magnitude of the stars. The observatory will be open on Tuesday and Thursday evenings under the charge of Mr. Plummer.

In the Chemical Department of the Museum, Prof. Odling will give a course on Elementary Facts and Doctrines. Mr. Fisher will lecture on Inorganic Chemistry, and Dr. Watts on Organic Chemistry. The laboratory will lose the services of Mr. F. D. Brown in the middle of the term, as he has been elected to the Professorship of Chemistry and Physics in the New University at Auckland, and leaves for New Zealand in March.

In the Biological Department Prof. Moseley continues his course on Comparative Anatomy (followed by practical work). Mr. Hatchett Jackson lectures on the Fundamental Principles of Embryology, Mr. Poulton on the Geographical Distribution of Animals, Mr. Lewis Morgan on the Teeth of Vertebrata and on Human Osteology, and Mr. Hickson on Histology. Mr. Barclay Thompson has been obliged to give up lecturing on account of ill health.

Prof. Prestwich gives a course of lectures on Stratigraphical Geology.

The following courses will be given in the private College laboratories:—At Christchurch Mr. Vernon Harcourt lectures and gives practical instruction in Quantitative Analysis, and Mr. Baynes on Thermo-dynamics. At Balliol Mr. Dixon lectures on Organic Chemistry, and Elementary Electricity. At Magdalen Mr. Yule gives a course of demonstrations on the Chemical and Physical Properties of the Blood, Circulation, Respiration, &c.; and Mr. Chapman gives a practical course on Elementary Vegetable Morphology.

A scholarship in Natural Science will be offered at Keble College of the value of 80*l.* per annum. The examination will be in Biology and Chemistry; a scholarship will also be offered for competition at Queen's College in Physics, Chemistry, or Biology.

CAMBRIDGE.—Mr. J. E. Marr, M.A., Fellow of St. Johns College, is the Sedgwick Prizeman this year.

Science lectures commence on the following days: Prof. Liveing, General Principles of Chemistry, January 23; Prof. Dewar, Organic Chemistry, January 23; Prof. Newton, Geographical Distribution of Vertebrate Animals, January 31; Mr. Caldwell, Morphology of Invertebrata, Advanced, February 1; Dr. Hans Gadow, Morphology of Vertebrata, Advanced, January 30.

The names of Messrs. Casey (Trin.), Harvey (King's), A. R. Johnson (St. John's), Turner (Trin.), and Welsh (Jesus) appear in alphabetical order in the First Division of the List for the Third Part of the Mathematical Tripos, to which only the Wranglers were admitted. One name is in the second division, and eight in the third.

MR. F. J. M. PAGE, B.Sc., F.C.S., of University College, London, was elected, on January 11, Lecturer on Physics at the London Hospital Medical College.

SCIENTIFIC SERIALS

Journal of the Franklin Institute, December, 1882.—An improved dynamometer, by W. P. Tatham.—The isochronal Worthington pumping engine, by J. K. Maxwell.—Explosive and dangerous dusts, by T. W. Tobin.—Economical steam power (continued), by W. B. Le Van.—The universality of vibrations, by C. C. Haskins.—Report on European sewerage systems, &c. (continued), by R. Hering.

Annalen der Physik und Chemie, No 13 (December 2, 1882).—Absolute measurements with bifilar suspension, and especially two methods for determining the horizontal intensity of terrestrial magnetism without time measurement, by F. Kohlrausch.—The reduction of the Siemens unit to absolute measure, by E. Dorn.—On electric vibrations with special regard to their phases, by A. Oberbeck.—Experimental researches on galvanic polarisation, by F. Streintz.—On M. A. Guebhard's representation of equipotential curves, by E. Mach.—The electromotive force of the Daniell element, by E. Kittler.—On amalgamation-currents, by H. Haga.—Explanation of electric shadows in free air, by P. Riess.—On the material parts in electric sparks, by F. Wächter.—On the magnetic screening action of iron, by J. Stefan.—On tone-vibrations of solid bodies in presence of liquids, by F. Auerbach.—A small alteration of the pyknometer, by E. Wiedemann.—Remark on Herr Galn's memoir on the density of the luminiferous ether, by the same.—On the true cohesion of liquids, by the same.—On the condensation of liquids on solid bodies, by the same.—The leucoscope and some observations made with it, by A. König.—Contribution to the theory of diffraction in telescope-tubes, by H. Struve.—On the elliptical polarisation of reflected diffracted light, by W. Kœnig.—On the Poggendorff fall-machine, by K. L. Bauer.—Contributions to the history of natural sciences among the Arabs, viii. and ix., by E. Wiedemann.

Bulletin de l'Academie Royale des Sciences de Belgique, Nos. 9 and 10.—Notice on a peculiarity in the aurora borealis of October 2, 1882, and on the increase in intensity of scintillation of stars during auroræ, by C. Montigny.—Some theorems of elementary geometry, by E. Catalan.—On curves of the third order, by C. Le Paige.—Aspect of the great comet of 1882 (Cruls) observed at Louvain, by F. Terby.—Note on the aurora borealis of October 2, 1882, by the same.—Action of chlorine on tertiary butylic chloride, by Baron d'Otreppe de Buvette.

No. 11.—Note on some bones of the Biscay whale at the

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Museum of La Rochelle, by P. J. Van Beneden.—On some uniform geometric transformations, by C. Le Paige.—Second notice on the comet, by F. Terby.—On the functions of M. Prym and M. Hermite, by A. Genocchi.—On glycogen in Mucorineæ, by L. Errera.

Journal de Physique, December, 1882.—Remarks on timbre, by M. Kœnig.—Remarks on the critical state, by M. Stolatow.—Experimental study of the reflection of actinic rays; influence of specular polish, by M de Chardonnet.—Note on the theory of the Laurent saccharimeter with white light, by M. Dufet.—Notes of science in *Il Nuovo Cimento* and the *Journal* of the Russian Physico-Chemical Society.

Rivista Scientifico-Industriale e Giornale del Naturalista, October 31, and November 15 and 30, 1882.—Inconveniences of the usual pluviometer, and a few words about the pluvio-pulverometer, an apparatus for rain, dew, and atmospheric dust, by P. Lancetta.—Non-sensitive mercury thermometer; demonstration of the principle of the telephone, by G. Govi.—A doe with hairy horns.—Review of a prize memoir by G. Poloni, on the permanent magnetism of steel at different temperatures, by A. W.—Double-action mercury air-pump, by G. Serraville.—Fundamental principle of electrostatics, by S. Mugna.—Male genital armatures of saltatory Orthoptera, by A. Tozzetti.—Brief notice of the fluoriferous volcanoes of Campania, by A. Scacchi.

Reale Istituto Lombardo di Scienze e Lettere. Rendiconti. Vol. xxv., fasc. xviii.—On a recent landslip near Belluno, by T. Taramelli.—On drunkenness in Milan, II., by A. Verga.—Jacobi's theorem regarding periodicity, and the illegitimacy of a part of the consequnces that have been deduced from it, by F. Casorati.

Nouveaux Mémoires de la Société Helvetique des Sciences Naturelles, vol. xxviii., 2nd part.—The Diluvium round Paris and its position in the Pleistocene, by A. Rothpletz.

SOCIETIES AND ACADEMIES

LONDON

Mathematical Society, January 11.—Prof. Henrici, F.R.S., president, in the chair.—Messrs. H. T. Gerrans and W. L. Mollison were elected members.—Dr. Hirst, F.R.S., spoke on the resolution of congruences into systems of quadric reguli; Mr. Glaisher, F.R.S., discussed the solution of a differential equation allied to Riccati's; and Mr. Tucker communicated a paper by Prof. Cayley, F.R.S., on the automorphic transformation of a binary cubic function.

Zoological Society, December 19, 1882.—Prof. W. H. Flower, LL.D., F.R.S., president, in the chair.—Mr. Sclater exhibited some photographs of a new Zebra, from Shoa, lately named *Equus grevyi*, by M. A. Milne-Edwards, F.M.Z.S., which had been sent to him by that gentleman, and pointed out the difference which separated this animal from the nearly allied *E. zebra*.—The Rev. H. H. Slater, F.Z.S., exhibited and made remarks on the skin of a Shrike (*Lanius* sp. inc.) which had been obtained near Spurn Point, Yorkshire.—The Secretary exhibited, on behalf of Lord Lilford, the skin of a young male *Emberiza rustica*, which had been taken at Elstree Reservoir on November 19 last. Only one other example of this bird had hitherto been recorded as having been met with in Great Britain.—Dr. Günther exhibited, on behalf of Sir Campbell Orde, Bart., a specimen of a Charr (*Salmo alpinus*), obtained in a loch in North Uist, being the first example ever obtained in this loch.—Mr. P. H. Carpenter exhibited and made remarks on some microscopical preparations of *Antedon eschrichti*, in which a nervous plexus derived from the fibrillar envelope of the chambered organ was visible at the sides of the ambulacra of the disk.—Prof. Flower exhibited a photograph (presented to the Society by Mr. James Farmer, F.Z.S.) of Seal Point, Farallone Islands, off the coast of California, showing the immense number of Seals (*Otaria gillespii*, M'Bain) frequenting that locality.—Prof. Flower read a paper on the whales of the genus *Hyperoodon*, in which he pointed out that one of the most important points in the history of these animals yet unsolved was whether the large-headed form, with great development of the maxillary crests, called by Dr. J. E. Gray *Lagenocetus latifrons*, was a distinct species, or whether, as suspected by Eschricht, it was the adult male of the common form known as *Hyperoodon rostratus*. The author had asked Capt. David Gray to avail himself of his exceptionally favourable opportunities of observing these animals in their native haunts, to solve this question, with the result shown in the next communication.—A communication was read from Capt. David Gray, ss. *Eclipse*, called "Notes on the Characters and Habits of the Bottlenose Whale (*Hyperodoon*)," in which it was stated that he had killed 203 of these animals last season, and had traced in the males every gradation of development between the two forms, and had therefore conclusively proved that *Hyperoodon* or *Lagenocetus latifrons* had no existence as a distinct species. The communication was illustrated by sketches and photographs, showing the external characters and cranium in various stages of growth.—Mr. P. H. Carpenter read a paper on the classification of the *Comatulæ*. He criticised the method of formulation recently proposed by Prof. F. J. Bell, and pointed out its disadvantages for the purposes of classification, owing to its being inapplicable to those *Comatulæ* which have irregular arm-divisions. He explained his own system of formulation and classification, and stated that he believed it to be capable of dealing with all possible variations of *Comætula* structure.—Mr. F. Day read a paper on the identity of *Arnoglossus lophotes*, Gthr., with *Pleuronectes grohmanni*, Bonap. A second paper by Mr. Day contained remarks on some hybrids between Salmon and Trout.—A paper by Messrs. Godman and Salvin was read, describing some Butterflies from New Ireland, received from the Rev. G. Brown and Mr. E. L. Layard. Among these were examples of two new species, named respectively *Prothoe layardi* and *Danaius adustus*.—Mr. Oldfield Thomas read a paper containing descriptions of two new species of Fruit-Bats of the genus *Pteropus* from the Caroline Islands. The author proposed to call them *Pteropus phæocephalus* and *Pt. breviceps*.—A communication was read from Major G. F. L. Marshall, F.Z.S., containing some notes on Asiatic Butterflies. A species of *Amecera* was mentioned as new to the Beluchistan fauna, and three species were described as new to science.—Mr. G. A. Boulenger read the description of a new species of Lizard from Dacotah, based upon some specimens lately presented to the Society's collection by Mr. S. Garman, of the Museum of Comparative Zoology, Cambridge, Mass., and proposed to name it *Sceloporus garmani*.—Mr. Arthur G. Butler read a paper in which he gave an account of a collection of Spiders made by the Rev. Deans Cowan in Madagascar. In addition to many inteesting and singular forms were specimens of the curious tailed species *Arachnoura scorpionoides* from Central Madagascar. Six new species were described.—Mr. W. N. Parker read a paper on some points in the anatomy of the Indian Tapir.—Mr. Herbert Druce read a paper descriptive of new species of Moths chiefly from Western Africa and New Guinea. Fifteen new species were described, as was also a new genus of *Chalcosiidæ* from New Guinea.

Geological Society, December 20, 1882.—J. W. Hulke, F.R.S., president, in the chair.—Percival Fowler, Alfred Eley Preston, and Robert Blake White, were elected Fellows of the Society.—The following communications were read:—On generic characters in the order Sauropterygia, by Prof. Owen, C.B., F.R.S. After referring to the subdivision of De La Beche's group of Enaliosauria into the orders Ichthyopterygia and Sauropterygia, the author indicated that the latter showed differences in the proportional length of the neck and the number and form of its vertebræ bearing relation to the size of the head, together with modifications of the teeth, of the sterno-coraco-scapular frame and of the paddle-bones, leading to the formation of two genera, namely, *Plesiosaurus* and *Pliosaurus*, the latter so-called to indicate the nearer approach made by it to a generalised Saurian type. In Crocodilia the crowns of the teeth show a pair of strong enamel ridges, placed on opposite sides of the teeth, and these occur also in *Pliosaurus*; while in *Plesiosaurus* they are not present. *Pliosaurus* further approaches the fresh-water Saurians by the large size of the head and the shortness of the neck.—On the origin of valley-lakes, mainly with reference to the lakes of the Northern Alps, by the Rev. A. Irving, B.A., B.Sc., F.G.S. The author, having given reasons for considering this question, still an open one, proceeded to criticise Prof. Ramsay's theory as it was expounded by him in 1862. The author proceeded to show that the lakes of the Northern Alps are found, as a rule, just among those strata where subsidence would be most likely to occur. In this way it was shown that we are *not shut up*, by Prof. Ramsay's reasoning, to the hypothesis of *glacial excavation*. Further, other agencies than those discussed by Prof. Ramsay may have co-operated to form lakes,

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